

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Prop for Use in Building Construction and System Utilising Such Prop

We, AUDAX LIMITED, of Central Avenue, West Molesey, Surrey, a British Company, and WATES LIMITED, of 1260, London Road, Norbury, London, S.W.16., a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a prop for use in building construction and a system in which such prop is utilised. More particularly, the type of prop with which this invention is concerned is known as a "push-pull prop".

The object of this invention is to ensure greater safety, accuracy, speed and simplicity in the erection of buildings, especially multi-storey buildings, made from pre-cast panels or like elements of substantial dimensions each of which forms a complete wall or floor section. During erection a wall panel is lifted bodily by a crane to where it is required and it is then temporarily supported in the required position by one or more, usually two push-pull props connected to the wall panel near the upper end thereof and to a member or members disposed inwardly of the wall panel substantially level with the lower end thereof. A prop when in use, is therefore inclined upwardly and outwardly from its lower end. So that the wall panel can be finally adjusted in position props are adjustable in length.

According to one aspect of this invention there is provided a push-pull prop comprising an elongated tubular or other like body having at each end means whereby it may be pivotably connected to and between a member disposed inwardly of a wall panel to be supported and the upper end part of the wall panel, the connecting means at one end of

the body including a swivel joint which allows the body to rotate with respect to the pivot connection and the connecting means at the other end of the body also including screw-threaded co-operating parts which are adjustable relative to each other to vary the overall length of the prop.

According to another aspect of this invention there is provided a push-pull prop comprising an elongated tubular or like body having at one end means whereby it may be pivotably and swivelably connected to a member disposed inwardly of a wall panel to be supported and substantially level with the lower end thereof, and at the other end means whereby it may be pivotably connected to said wall panel near the upper end thereof, the latter end means also including screw-threaded co-operating parts which are adjustable relative to each other to vary the overall length of the prop.

This invention also provides a system for use in the erection of buildings made from pre-cast panels or like elements of substantial dimensions, which includes members each adapted to be secured to a floor forming element inwardly of the edges thereof, and push-pull props each comprising an elongated tubular or like body having at each end means whereby it may be pivotably connected to and between a member secured as aforesaid and the upper end part of a wall panel placed in position so as to extend upwardly from one edge of said floor-forming element, the connecting means at one end of the body including a swivel joint which allows the body to rotate with respect to the pivot connection, and the connecting means at the other end of the body also including screw-threaded co-operating parts which are ad-

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- justable relative to each other to vary the overall length of the prop.
- One embodiment of this invention will now be described in some detail, but this is purely by way of example.
- In the general system according to this embodiment there are two distinct main units, namely a prop-end locating member and a push-pull prop.
- 10 In the accompanying drawings:—
- Figures 1 and 2 show one form of prop end locating member in side elevation and plan respectively,
- 15 Figure 3 shows in perspective part of a prop end locating member as shown in Figure 1, and a push-pull prop when in use with a wall bracket,
- 20 Figures 4 and 5 are fragmentary part-sectional views drawn on a larger scale, showing the two ends of a push-pull prop;
- Figure 6 is a fragmentary perspective view showing the connection of a push-pull prop to another form of prop end locating member.
- 25 Figures 7 and 8 show this form of prop end locating member in side elevation and section;
- Figure 9 is a perspective view illustrating a form of adaptor.
- 30 Figures 10 and 11 show this adaptor in side and end elevation respectively,
- Figure 12 is a perspective view illustrating another form of adaptor,
- 35 Figure 13 is a plan view of this adaptor,
- Figure 14 is a section on the line XIV—XIV in Figure 13,
- 40 Figures 15 and 16 show in front and side elevation another form of wall bracket,
- Figure 17 shows yet another form of wall bracket,
- 45 Figure 18 shows in perspective a bracing member for supporting one wall panel from another, and
- Figures 19 and 20 show this bracing member in plan and elevation respectively.
- 50 A prop end locating member 1 (Figures 1 and 2) is of channel shape in cross section, with a pair of lifting brackets 2 disposed centrally thereof. In the base thereof it is furnished with apertures 3 at each end, the apertures as a whole being symmetrically arranged. These apertures are designed to receive bolts 4 (Figure 3) or the like whereby the locating member 1 can be fixedly secured to or on a floor forming element 5, the intention being that the locating member should extend, for example, parallel to two sides of the floor forming element and perpendicularly of the other two, that is assuming that the floor forming element is of rectangular shape as it normally would be.
- 55 In addition to the apertures in the base, opposed evenly spaced apertures 6 are provided in the side flanges of the locating member.
- 60 Lifting handles 7 are conveniently provided at each end of the locating member.
- A push-pull prop (Figures 3, 4 and 5) has a main body part 10 formed from a length of tube. At its lower end the body part is swivelably connected to a forked member 11 in the branches of which are provided opposed apertures 12 adapted to receive a locating and pivot pin 13 which in use will also pass through an aperture 6 in one of the side flanges of a locating member 1, whereby the prop as a whole will be pivotably connected to the locating member. The side flange of the locating member would, of course, be received between the branches of the forked member 11 on the end of the prop.
- 65 At its other end the body part 10 is provided inside with an internally screw threaded collar 15 (Figure 4) in which engages a correspondingly screw threaded spigot 16 which at its outer end 16<sup>a</sup> is plain and has provided therein a transverse aperture adapted also to receive a locating and pivot pin 13 which in use will also pass through a pair of spaced lugs 18 forming part of a wall bracket 19 which is fixed to a wall panel 20 near the upper end thereof and between which the end of the spigot 16 is inserted. Thus the prop as a whole will also be pivotably connected to the wall panel 20 extending upwardly from one edge of the floor forming element 5 to which the locating member 1 is secured.
- 70 As shown in Figures 4 and 5 the locating and pivot pins 13 are preferably carried by chains 21 connected to the forked member 11 and spigot end 16<sup>a</sup> respectively so that they cannot normally be lost or mislaid. Each pin carries between bifurcations provided at the free end thereof a slotted securing plate 22 which is rockable about a pin 23 extending through and between the bifurcations. For insertion of a pin, for example through registering apertures 12 and 6, the securing plate 22 is turned into line with the body of the pin as indicated in broken lines in Figure 5. After insertion the securing plate 22 is turned at right angles to the body of the pin as shown in full lines. The pin cannot be withdrawn again unless and until the securing plate 22 is again turned into line with the body of the pin.
- 75 Centrally the body part of the prop is provided with radially disposed outwardly extending handles 25 by means of which the body part may be turned. These handles may be formed, for example, by an initially U-shaped member the legs of which are passed through diametrically opposed apertures in the tubular body part until the member as a whole is centrally disposed. It is fixed in this position, as by welding, and a rod is fixed between the free ends thereof.
- 80 On turning the body part, the collar 15 in the one end thereof will be rotated with respect to the co-operating spigot 16, whereby
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the length of the prop as a whole will be altered. Also provided on the screw-threaded portion of the spigot 16 is a locking collar 26 which can be engaged with the end of the body part 10 when the prop has been adjusted to a desired length.

In the erection of a building using the system in accordance with this invention it is envisaged that at least two locating members 1 will be temporarily secured in spaced parallel relationship to a floor forming element 5 in the casting thereof. Wall panels 20 for the opposite sides of the floor forming element which extend perpendicularly of the locating members will each be supported by two props, one connected to each locating member. Here again the lugged brackets 19 in the wall panels 20 will be temporarily secured therein during the casting of the panels. The props for one wall panel will cross over the props for the other wall panel; it is for this reason that the locating members are made of channel shape in cross section with apertures in each side flange.

After the wall panels 20 have been finally secured in position the props are removed. The lugged brackets 19 in these panels are removed, and so also are the locating members 1 on the floor forming element 5, all then being available for use again.

Prop end locating members are made in a convenient range of sizes, one size only have been illustrated. In some instances, however, there may be insufficient space for even a channel shaped locating member of very short length. Therefore a locating member as shown in Figures 6, 7 and 8 is provided. This consists of a plate 30 having a downwardly extending locating and fixing bolt 31 and a centrally disposed upstanding lug 32 in which is formed an aperture 33. In use the lug 32 is introduced between the branches of the forked member 11 on the lower end of a prop and secured by a pin 13 passed through the registering apertures 12 and 33.

To provide for the connection of a push-pull prop displaced to one side of a locating member 1 an adaptor 40 as shown in Figures 9, 10 and 11 is provided. Such an adaptor is also of channel shape and has in the side flanges thereof apertures 41 which are evenly spaced identically with the apertures 6 in a locating member 1. Thus one flange of the adaptor can be bolted to the side of a locating member 1 and the other flange used for the connection of the end of a push-pull prop as shown in Figure 9.

To provide for the connection of a push-pull prop disposed in a plane extending perpendicularly of a locating member 1 an adaptor 45 as shown in Figures 12, 13 and 14 is provided. Such an adaptor comprises a plate 46 with an upstanding flange 47 at one edge, this flange having therein apertures 48 which are evenly spaced identically with the ap-

tures 6 in a locating member 1. Centrally the plate 46 is provided with another upstanding flange 49 which is disposed at right angles to the flange 47 and has near the free end thereof an aperture 50. In use the flange 47 is bolted to the side of a locating member 1, and the flange 49 is used for the connection of the end of a push-pull prop, as shown in Figure 12, the flange 49 being introduced between the branches of the forked member 11 on the lower end of the prop and a pin 13 being passed through the registering apertures 12 and 50.

Instead of the simple form of wall bracket 19 shown in Figure 3, brackets such as those shown in Figures 15, 16 and 17 may be used. Such a bracket comprises a main part 60 of channel form provided with apertures 61 for securing bolts. Extending to one side of the main part 60 is a plate 62 carrying apertured lugs 63. The plate 62 may be disposed centrally of the main part (Figure 15) or may be offset (Figure 17).

Adaptors and wall brackets can each be made in a range of convenient sizes.

To support wall panels disposed parallel to locating members 1, appropriately formed bracing members may be provided which will extend between them and wall panels supported by push-pull props as above described. Such a bracing member is shown in Figures 18, 19 and 20 and comprises two end plates 70 disposed perpendicularly of each other with a rectangular section brace 71 extending between them, the plates 70 having apertures 72 therein for securing bolts.

#### WHAT WE CLAIM IS:—

1. A push-pull prop comprising an elongated tubular or other like body having at each end means whereby it may be pivotably connected to and between a member disposed inwardly of a wall panel to be supported and the upper end part of the wall panel, the connecting means at one end of the body including a swivel joint which allows the body to rotate with respect to the pivot connection and the connecting means at the other end of the body also including screw-threaded co-operating parts which are adjustable relative to each other to vary the overall length of the prop.

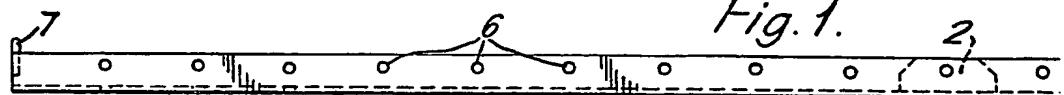
2. A push-pull prop comprising an elongated tubular or like body having at one end means whereby it may be pivotably and swivelably connected to a member disposed inwardly of a wall panel to be supported and substantially level with the lower end thereof, and at the other end means whereby it may be pivotably connected to said wall panel near the upper end thereof, the latter end means also including screw-threaded co-operating parts which are adjustable relative to each other to vary the overall length of the prop.

3. A system for use in the erection of buildings made from pre-cast panels or like elements of substantial dimensions, which includes members each adapted to be secured to a floor forming element inwardly of the edges thereof, and push-pull props each comprising an elongated tubular or like body having at each end means whereby it may be pivotably connected to and between a member secured as aforesaid and the upper end part of a wall panel placed in position so as to extend upwardly from one edge of said floor-forming element, the connecting means at one end of the body including a swivel joint which allows the body to rotate with respect to the pivot connection, and the connecting means at the other end of the body also including screw-threaded co-operating parts which are adjustable relative to each other to vary the overall length of the prop.
4. A push-pull prop as claimed in Claim 1 or 2 in combination with a member as aforesaid adapted fixedly to be secured to a floor forming element inwardly of a wall panel to be supported, and a bracket adapted to be fixed to the upper end of the wall panel and to one end of the prop.
5. The combination as claimed in Claim 4 wherein the connection between the prop and the bracket includes a spigot adapted pivotably to be engaged with the bracket and having a screw thread connection with the body of the prop whereby rotation of said body part will result in variation of the overall length of the prop.
6. The combination as claimed in Claim
- 4 or 5 wherein said member is of channel shape in cross section with apertures in the side flanges thereof, and the push-pull prop includes a forked member adapted to be engaged with one or other of said flanges, the branches of said forked member having opposed apertures therein which can be brought into register with an aperture in a flange so that the registering apertures can receive a locating and pivot pin.
7. A push-pull prop substantially as herein described with reference to and as shown in Figures 3, 4 and 5 of the accompanying drawings.
8. A system for use in the erection of buildings made from pre-cast panels or like elements of substantial dimensions substantially as herein described with reference to and as shown in Figures 1 to 5 of the accompanying drawings.
9. A system as claimed in Claim 8 which also includes the use of any of the members substantially as herein described with reference to and as shown in Figures 6 to 20 of the accompanying drawings.

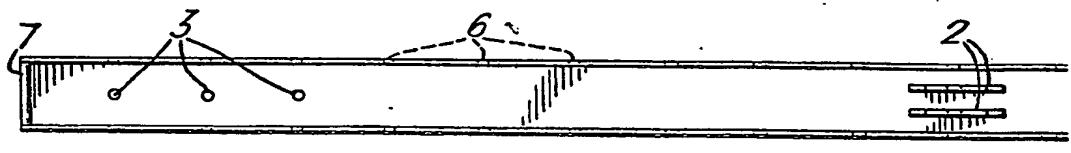
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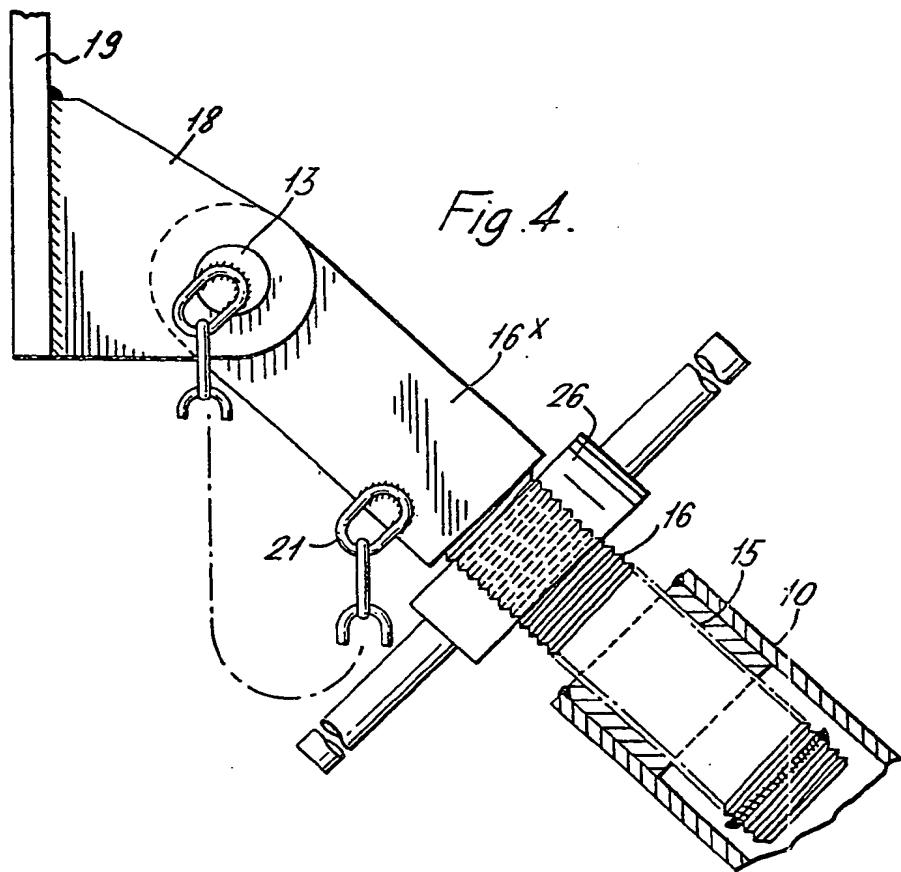
*Fig. 1.*



*Fig. 2.*



*Fig. 4.*



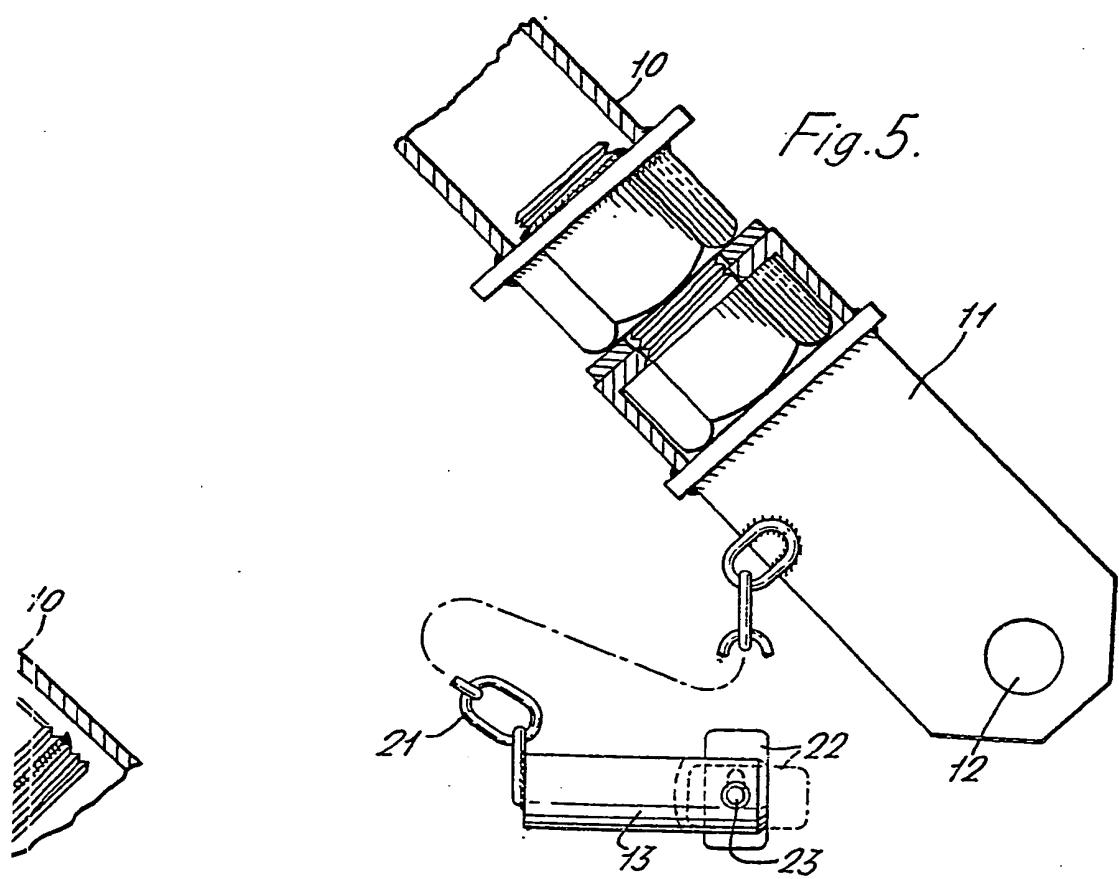
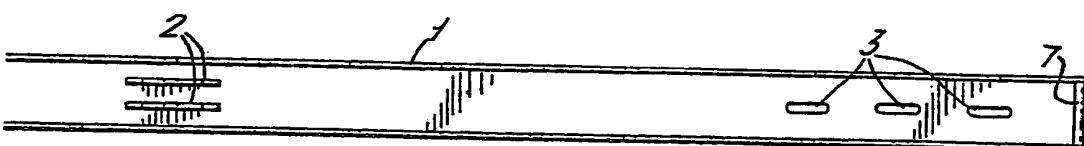
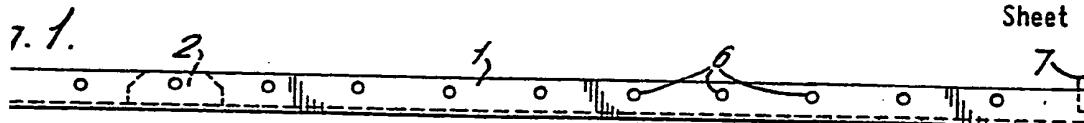
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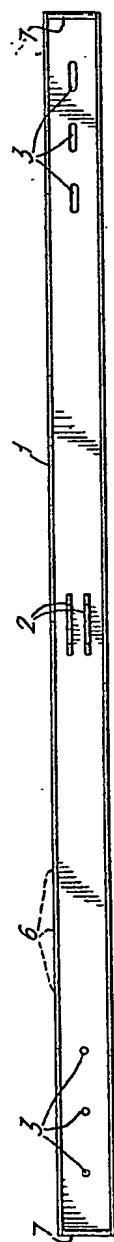
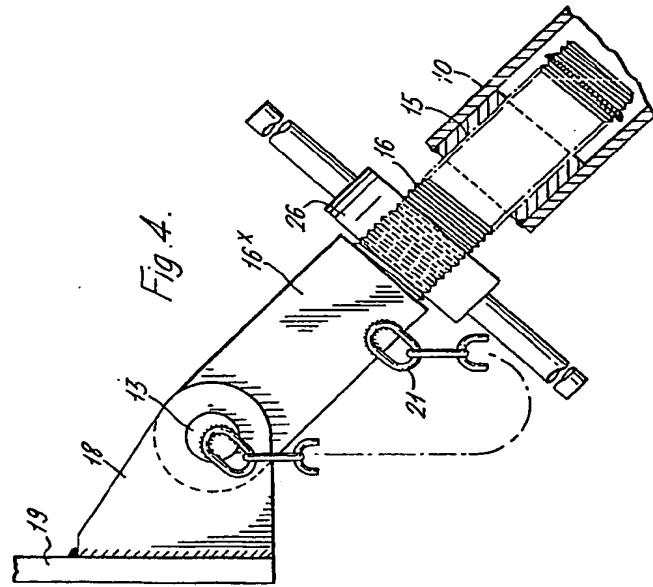
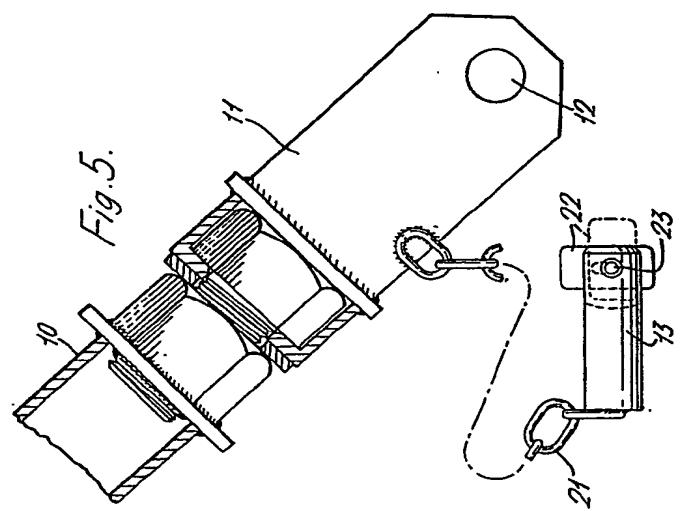


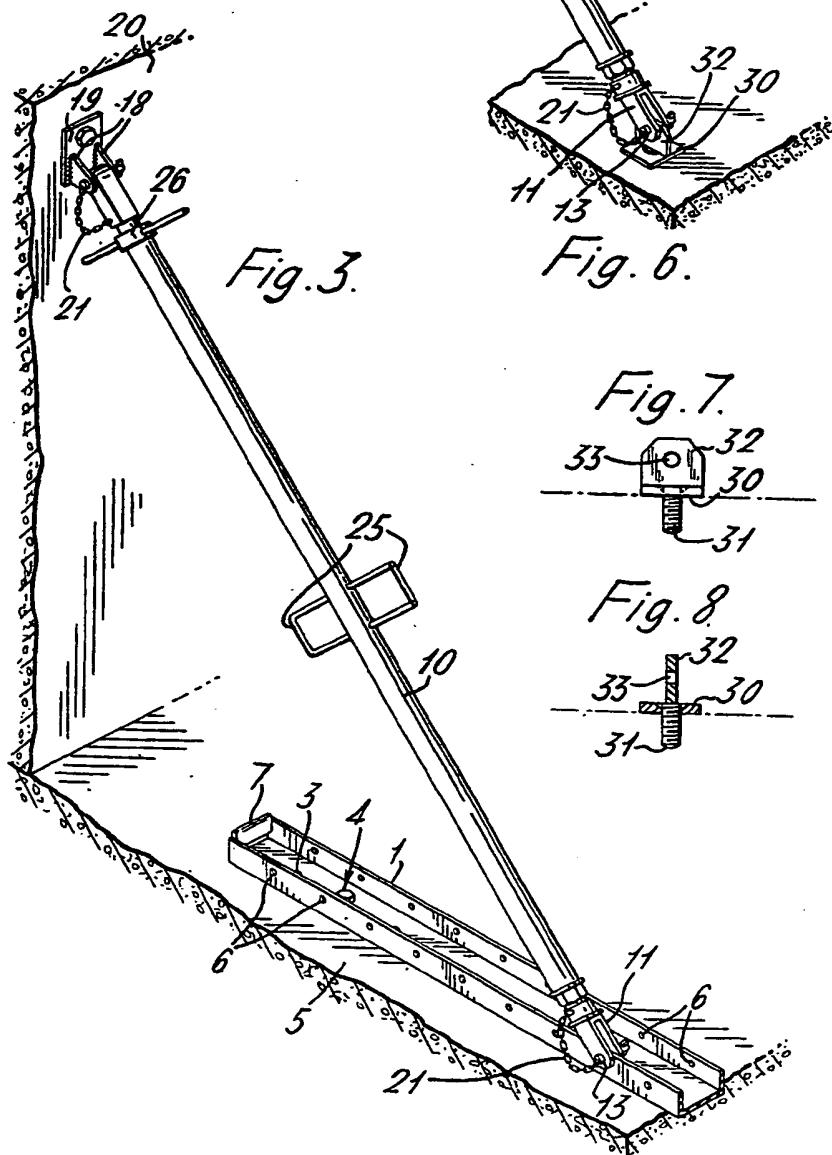
Fig. 2.



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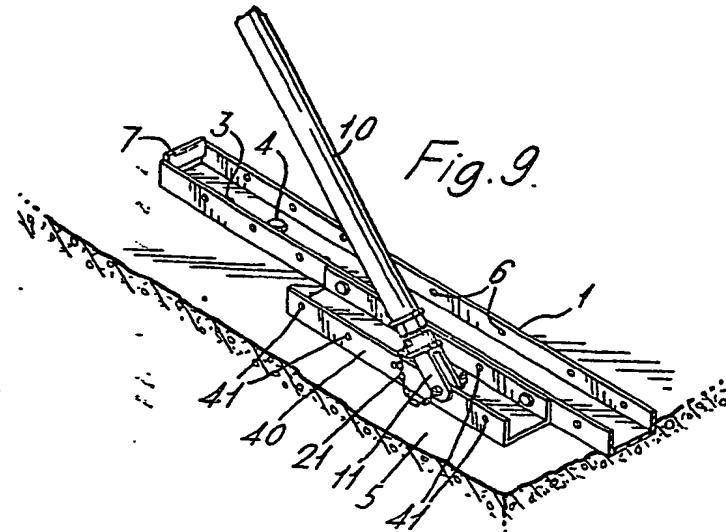


Fig. 9.

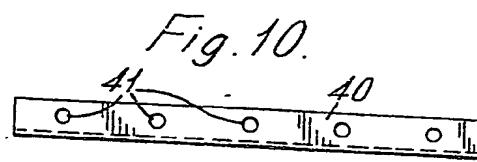


Fig. 10.

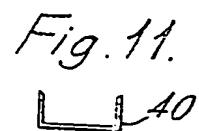


Fig. 11.

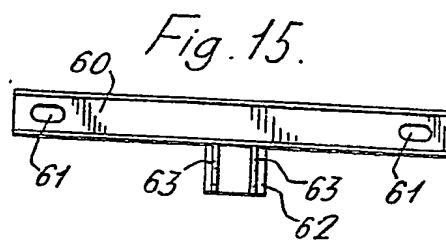


Fig. 15.

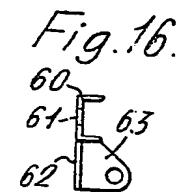


Fig. 16.

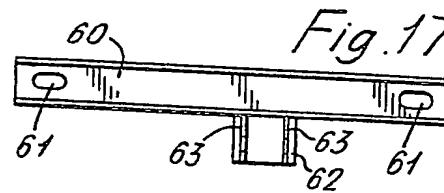


Fig. 17.



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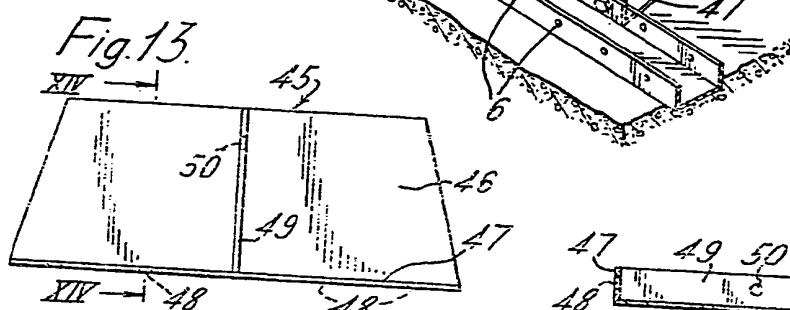
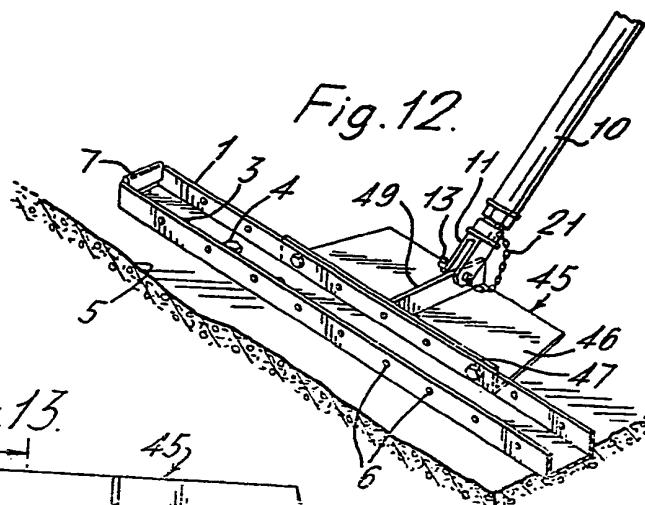


Fig. 14.

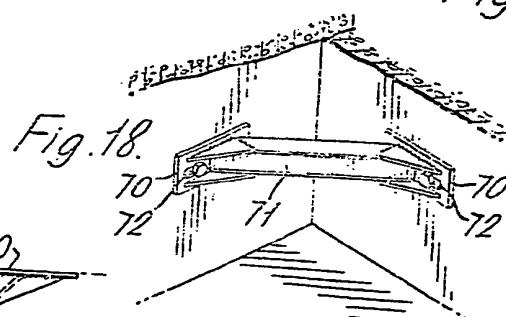


Fig. 19.

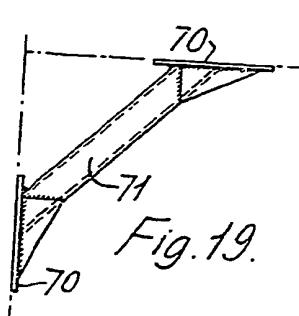
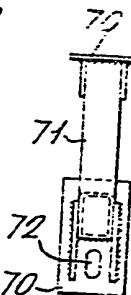


Fig. 20.



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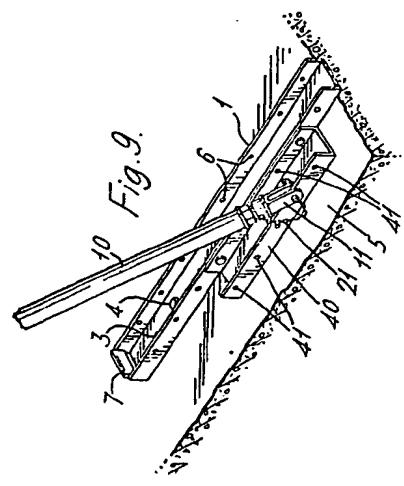


Fig. 9.

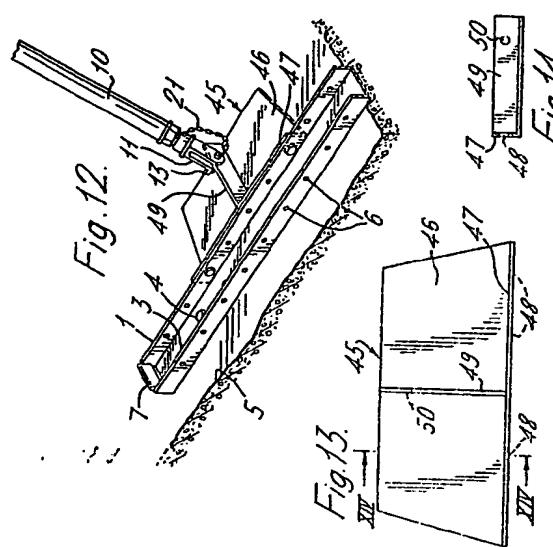


Fig. 10.  
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Fig. 11.  
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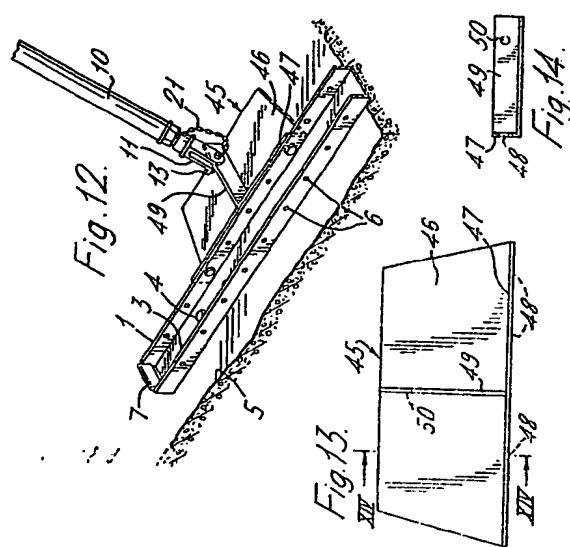


Fig. 12.  
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Fig. 13.

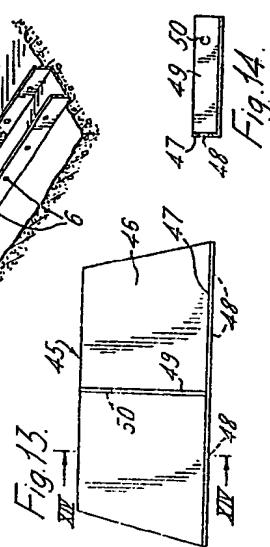
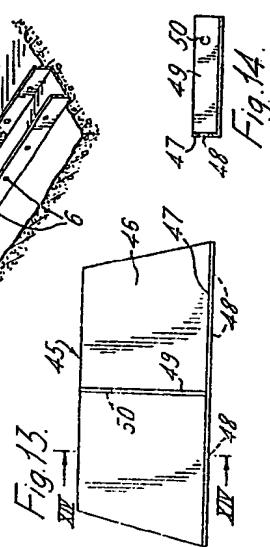


Fig. 14.

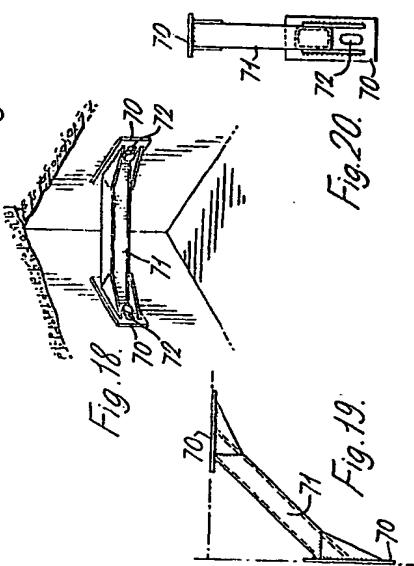


Fig. 15.

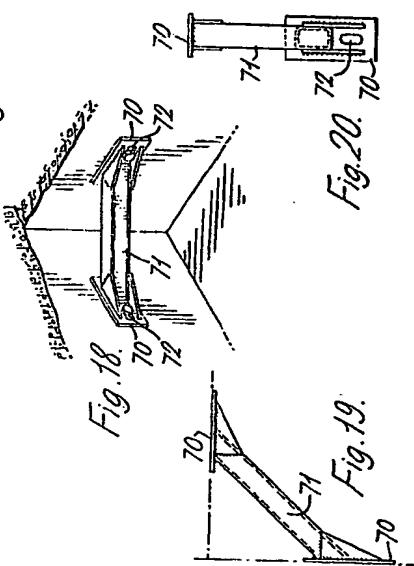


Fig. 16.

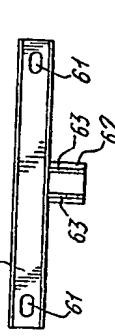


Fig. 17.

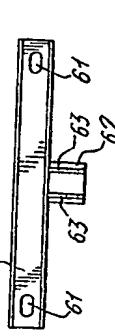


Fig. 18.

Fig. 19.

Fig. 20.

Fig. 21.

